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Takashi YAMAZAKI*: **On the floral structure, seed development, and affinities of *Deinostema*, a new genus of Scrophulariaceae. (1)** *****

山 崎 敬*: サワトウガラシ属とその類縁 (1)

Gratiola includes nearly 20 species, chiefly found in the temperate zone of North and South America, and a few occur in Australia and Europe. From the temperate zone of Asia, four species were reported, i. e. *G. japonica*, *G. fluviatilis*, *G. violacea*, and *G. adenocaula*.

Gratiola is divided into two sections by Pennell—*Gratiolaria* and *Nibora*. *G. japonica* seems to me to belong to *Nibora*, although it differs from the typical form in having usually sessile flowers.

G. fluviatilis is considered to be but a form of *G. virginiana* L., and especially sessile flowers of the former match well with autumnal cleistogamous flowers of the latter. But as I had no chance to examine many materials, the question is left unsettled.

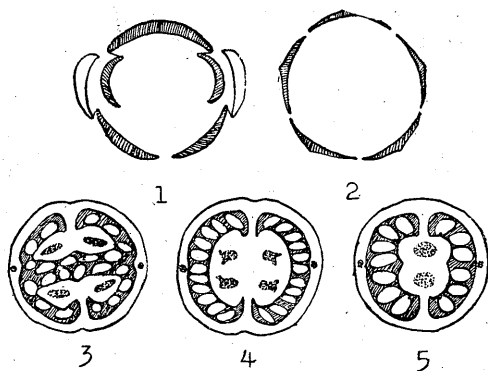


Fig. 1. 1) The calyx of *Gratiola japonica* in transverse section. 2) The same of *Deinostema violacea*. 3) The ovary of *Dopatrium junceum* in transverse section. 4) The same of *Gratiola japonica*. 5) The same of *Deinostema violacea*.

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G. violacea and *G. adenocaula* have no bractlets, but the other *Gratiola* species have two bractlets subtending the calyx except for a few species as *G. ebracteata* and *G. ramosa*. According to Pennell (1933, 1935)¹⁾, *G. ramosa* has only one minute bractlet or lacking and the reduction of bractlets is observed in this species. While in *G. violacea* and *G. adenocaula*, the calyx matches well with that of *Lindernia* and *Dopatrium*, in which the calyx has no bractlet from the beginning.

G. mexicana has no bractlet too, and closely resembles *G. adenocaula* in appearance, but differs from the latter in having divergent anther-cells, triangular upper-lips, and anterior forked filaments arising from the upper part of the corolla. These characters are the same with those of *Lindernia*, especially with sect. *Americanae* (*Ilysanthes*), so *G. mexicana* should be transferred to *Lindernia*²⁾.

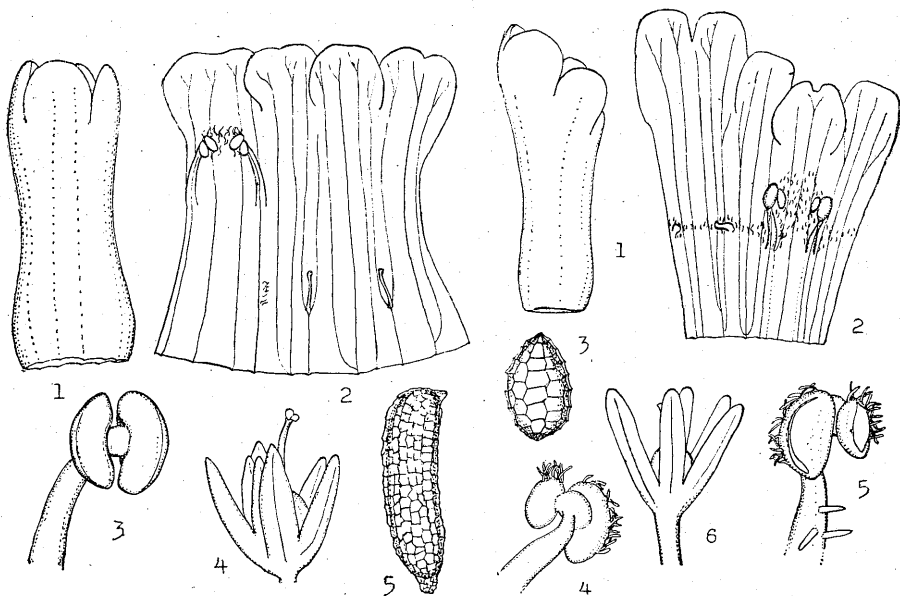


Fig. 2. *Gratiola japonica*. 1) corolla, $\times 7$, 2) corolla expanded, $\times 8$. 3) stamen. 4) Flower, corolla removed, $\times 5$. 5) seed, $\times 35$.

Fig. 3. *Dopatrium junceum*. 1) corolla, $\times 7$ 2) corolla expanded, $\times 9$. 3) seed, $\times 35$. 6) Flower, corolla removed, $\times 9$. 4,5) stamens.

1) Pennell in J. K. Small, Manual of the South-eastern Flora: 1192 (1933), and in Acad. Nat. Sci. Philadelphia, Monographs 1: 71-72 (1935).

2) *Lindernia mexicana* (S. Watson) Yamazaki comb. nov.—*Gratiola mexicana* S. Watson in Proc. Americ. Acad. Arts and Sci. 25: 159 (1890).—Mexico, Guadalajara 5000 ft (C. G. Pringle, no. 11650, 10 Oct. 1903).

In *Gratiola* the arrangement of the calyx-lobes is imbricate (fig. I-1); and *Gratiola* is conceived to have relation with such allied genera as *Herpestis*, *Bramia*, *Adenosma* and *Bacopa*, etc., in which the sepals are arranged in large three lobes and small two inner lobes. While in *G. violacea* and *G. adenocaula*, the arrangement of the calyx-lobes is valvate (fig. I-2) and agrees with that of *Lindernia* and *Dopatrium*.

In addition to the above mentioned facts, they are distinguished as follows: *G. violacea* and *G. adenocaula* are characterized in having campanulate corollas, deflected corolla-lobes, lower lips having the largest middle-lobe divided into two-lobes, fertile posterior stamens with revolute filaments and ciliated anthers (figs. IV). The typical *Gratiola* are characterized in having tubular corollas, straight corolla-lobes, lower lips with the smallest middle-lobe, fertile posterior stamens with straight filaments and glabrous anthers (figs. II).

G. violacea and *G. adenocaula* resemble *Dopatrium* by ciliated anthers, but differs in the largest posterior corolla-lobe, fertile anterior stamens with revolute filaments and oblong seeds with many small reticulations on the surface (figs. III, IV). The former has, as common in other Scrophulariaceae, the bilocular ovary having a swollen placenta (fig. I-5), but in *Dopatrium* the ovary is unilocular and has two placentae dividing into two lobes (fig. I-3). Basing on these remarkable differences, *G. violacea* and *G. adenocaula* are regarded to represent a new genus, *Deinostema*.

Deinostema Yamazaki gen. nov.—*Gratiola* L. sensu Maximowicz in Bull. Acad. Sci. St-Pét. 32: 512 (1888), pro parte.

Herba annua. Radix fibrosa. Caulis erectus tetragonus. Folia opposita subcarnosa sessilia semiamplexicaulia margine integerrima obsolete nervosa. Flores normales in axillis foliorum superiorum solitarii longipedicellati. Calyx campanulatus 5-partitus basi parum connatis apertus ebracteolatus. Corolla tubuloso-campanulata, limbo dilatato bilabiato, labio superiore reflexo orbiculato apice rotundato vel emarginato, labio inferiore superiore longiore dilatato irregulariter trilobato, lobo medio late orbiculato apice bilobato vel rotundato. Stamina 2 postica perfecta inclusa, filamentis brevibus tubo corollae inferiorae affixis superioribus tortis, connectibus subcarnosis, antherarum loculis disjunctis subparallelis breviter pilosis. Staminoidia antica 2 punctata tubo corollae inferiorae affixa. Ovarium ovato-globosum glabrum. Stylus filiformis calyce brevior apice flabel-latus intus stigmatosus. Capsula ovato-orbiculata calyce brevior, loculicida et

septicido dehiscens. Semina numerosa parva oblonga rufescentia basi funiculata, testa reticulata 10-striata. Flores claudentes in terminalibus ramulorum cauliniiorum inferiorum solitarii subsessiles, ramulibus brevissimis apice folia parva bracteaeformia obsitis, vel in axillis foliorum solitarii sessiles.

Deinostema violacea (Maximowicz)

Yamazaki, comb. nov.—*Gratiola violacea* Maxim. in Bull. Acad. Sci. St-Pét. **20**: 513 (1888); Komarov, Fl. Mansh. **3**: 422 t. 5-8 (1907); Nakai, Fl. Koreana **2**: 120 (1911); Furumi in Tokyo Bot. Mag. **30**: 117 (1916); Kitagwa, Lineam. Fl. Mansh. 393 (1939); Makino, Ill. Fl. Nipp. t. 444 (1940); Hara, Enum. Sperm. Jap. **1**: 251 (1948).—*Ilysanthes saginoides* Franchet et Savatier, Enum. Pl. Jap. **1**: 346 (1875), nom. nud.—*Gratiola violacea* var. *genuina* et var. *saginoides* Franchet et Savatier, l. c. **2**: 456 (1877); Makino, Phan. et Pter. Ill. **2**: t. 72-73 (1902).—*Gratiola axillaris* Nakai in Tokyo Bot. Mag. **23**: 190 (1909).—*Gratiola saginoides* (Franchet et Savatier) Matsumura, Ind. Pl. Jap. **2-2**: 560 (1912).—*Gratiola saginoides* var. *violacea* (Maxim.) Matsumura, l. c. (1912).

Distr. Honsyu, Shikoku, Kyusyu, Korea, and Manshuria australis.

Deinostema adenocaula (Maximowicz) Yamazaki, comb. nov.—*Gratiola adenocaula* Maximowicz in Bull. Acad. St-Pét. **32**: 513 (1888); Makino in Tokyo Bot. Mag. **4**: (173) (1890) et **8**: (508) (1894); Furumi in Tokyo Bot. Mag. **30**: 117 (1916); Nakai, Fl. Sylv. Koreana **14**: 65 (1924); Makino, Ill. Fl. Jap. 1-12, t. 74 (1934) et Ill. Fl. Nipp. t. 446 (1940); Hara, Enum. Sperm. Jap. **1**: 251 (1948).—*Gratiola violacea* var. *adenocaula* (Maxim.) Makino, Phan. et Pter. Ill.

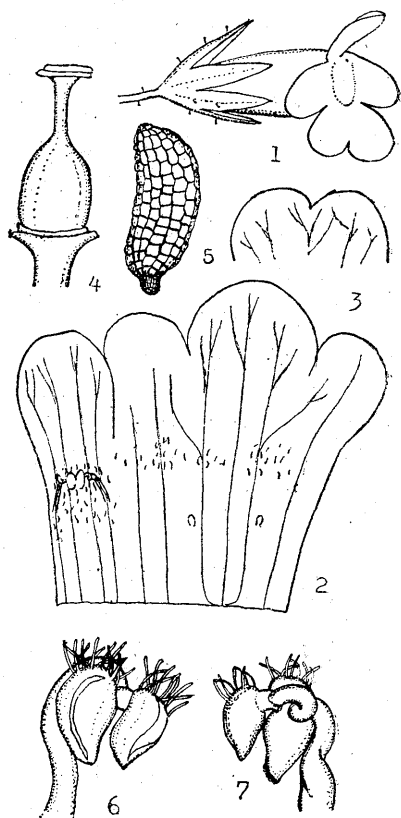


Fig. 4. 1) Flower of *Deinostema adenocaula*. ×6. 2-8) *Deinostema violacea*: 2) corolla expanded, ×8. 3) Divided middle lobe of flower lip. 4) ovary. 5) seed, ×35. 6, 7) stamens.

2: t. 74 (1902).

Distr. Honsyu, Sikoku, Kyusyu, and Korea (Ins. Queipaert).

オオアブノメ属 (*Gratiola*) は主に北米・南米の温帯地方に分布し、オーストラリア・ヨーロッパに各1種知られている。東亞では日本・朝鮮・南滿州に分布し、オオアブノメ、カミガモソウ、サワトウガラシ、マルバノサワトウガラシの4種が知られている。いづれも湿地に生じ、池の岸や水田の畔などに見られる。すべて東亞固有の種であり、個体数が極めて少なく、滅多に採集する機会がない。殊に近年土地が開けてくるにつれ急速に減少しつつあるようである。

カミガモソウは小泉博士が、大正9年9月と同13年8月とに京都上賀茂で採集された以外、誰も採集したことのない植物である。北米にある *G. virginiana* L. が酷似している。ただ後者が花に長い柄があり、葉は明瞭な鋸齒をもつのに、前者は花は殆んど無柄で、葉の鋸齒は波形である点異なるが、*G. virginiana* も秋の個体はしばしば別種と見られたこともあつた位で、葉の形がかなり變化し、花は殆んど無柄の閉鎖花であつてカミガモソウによく似てくる。カミガモソウも花はすべて閉鎖花のようであり、採集時期も秋のこととを考えると *G. virginiana* と同じ種類であろうと思われる。京都には偶然生えたものであろう。

サワトウガラシ、マルバノサワトウガラシは萼は小苞を欠き、萼片は重なりあわずに接している点でウリクサ属やアブノメ属によく似ている。胚乳形成の過程もオオアブノメ属とは全く異りアブノメ属に近縁であることを示している。アブノメ属とは莖の上部に柄のある正常花をつけ、下部に無柄の閉鎖花をつける点、葇に毛が生えている点などよく似ている。然しアブノメは2個の胎座は離れていて、したがって子房は一室であるというゴマノハグサ科としては特殊な形であり、イワタバコ科と同じ子房構造である。このような子房構造はアブノメだけでなくインドにあるアブノメ属の *Dopatrium lobioides* Benth. にもみられアブノメ属の特徴かと思われる。サワトウガラシでは2個の胎座はくっついていて、子房は2室となつている。又アブノメ属で花冠の背面の2雄蕊が痕跡的で、腹面の2雄蕊が発達している。これはオオアブノメやサワトウガラシが背面の雄蕊が発達するのと全く反対である。アブノメ属では完全雄蕊は眞直であり、種子は廣楕円形で荒い大きな網目模様をもっているのに、サワトウガラシ・マルバノサワトウガラシでは、正常花の花糸は常に1回轉し、種子は楕円形で多数の網目模様をもっている。以上のようなことからサワトウガラシ・マルバノサワトウガラシは独立の属とするのが適当と思う。

サワトウガラシに似て正常花を持たず、莖の寸のつまつたものをアカメソウと呼んでいるが、栄養状態が悪くて貧弱なものか、季節遅れの秋型の個体であつて特別な群ではない。